



SPRAY METHOD FOR FOOD CONSERVATION IN THE FREEZING
PROCESS

The invention relates to a method for preserving food, such as meat, game, fowl or fish, in the freezing process. Experience shows that these foods are preserved better and for a longer time if freezing takes place as fast as possible, as this is the only way to prevent the considerable tissue changes that damage the food during both storing and thawing. Only a fast freezing rate will freeze the blood inside the fibres, preventing it from emerging previously and preventing the tissues, both during freezing and thawing, from being perforated or burst by the blood crystals.

Currently, standard food freezing methods are not fast enough to prevent such tissue changes and therefore cannot provide fault-free food that can be conserved and used again. The method of submerging the food in a cooled salt solution does not achieve this objective either. It also does not offer any guarantee that salts or impurities enter the submerged items at the critical time of immersion under the fluid column. The disconnection of the osmotic interaction between saline solutions and submerged products, which is also intended in the known method by incorporating an ice precipitation phase, also fails at the time of immersion as the items to be frozen are normally warmer than said solution at the time of immersion for freezing, so that a prior treatment with ice water at 0° cannot provide essential changes.

The immersion process is therefore limited to the use of common salt solutions, and therefore restricted to certain temperatures. It cannot be used at the much lower freezing temperatures obtained with solutions of other salts, such as those attained with a chlorocalcium or chloromagnesium solution, which can provide a very fast freezing of the item, as the inevitable entry of these salts during the freezing process must not take place in food such as meat, fowl, game and fish. The process of immersion with ice precipitation cannot be used for the lowest temperatures attained in common salt solution, as this method for obtaining the ice precipitation phase must take place with unsaturated solutions.

Contrary to the above, the present method manages to freeze food with any salt solution at any temperature suitable for the freezing process. According to the invention, this is achieved by spraying the food with the salt solution. In fact, preserving food by spraying with cool water with a simultaneous application of cold is already known, so that a crust of ice

forms completely around the item. Particularly for thick items, this prevents a general freezing or a freezing at a desired temperature. This method is therefore entirely discarded for the effect sought.

On another hand, it has been proposed to spray items contained in packages with the freezing fluid. This gathers the freezing fluid around the item and increases the effect of the spray, so that the salt or the like can penetrate the items from the cold fluid. Naturally, this can only be used for foods that can withstand the entry of salt or fluids containing salt. In addition, this type of spraying prevents a fast freezing of the item, firstly because the coldest parts of the fluid are not in contact with the item and secondly because the capture of salt by the item during freezing hinders its freezing. The very low temperatures of the cold fluid cannot be used in this method, as the faster the surface freezes, the more the intended objective of simultaneous entry of the salt into the item is prevented. The use of cold fluids producing very low temperatures (chlorocalcium or chloromagnesium solutions) is also excluded as these salts must not be transferred to meat or the like.

According to the present invention the items are frozen quickly by inundating items that are suspended in the air or stacked freely, with a dense shower of a suitable cold fluid with a discretionary saturation and temperature, thereby preventing all harmful intermediate effects such as heating the coldest fluid before the effect is produced on the item, penetration of salt in the item. The cold fluid that sprays the items with a dense shower in a manner suitable to the lower temperature freezes the surface of the item suddenly, protecting it against the penetration of the cold fluid or its salts, so that the cold fluid that inundates the item freezes it only by cold transfer in the quickest manner. Spraying the suspended or stacked item with the cold fluid, in contrast to the known methods of immersion and spraying cited above, prevents the interposition of particles of ice, salt or impurities that insulate the item from the cold fluid, as well as the possible appearance of insulating stationary fluid areas that have already been heated by the item.

The aforementioned type of spraying also prevents damaging the surface of the food, which is often very sensitive to pressure, by breaking the pressure of the fluid column that penetrates, both in the immersion method and in the spraying method, through perforated packaging; in the latter case

it must also penetrate to facilitate the entry of salt.

If the frozen surface layer providing protection is formed with a simultaneous protection of the surface against pressure, the method can be used with any salt solution and therefore also for a surface freezing that takes place as fast as possible and subsequent freezing with salt solutions that admit significantly lower temperatures than common salt solutions, such as chlorocalcium or chloromagnesium solutions.

In addition, the method also offers the following essential advantages for a practical and economic use: the items remain available; the degree of freezing can be controlled at all times by a corresponding adjustment of the inundation shower. Particles of impurities, fungi, odorants, etc. that adhere to the item at the start of the treatment are inundated and immediately eliminated with the cold fluid. Afterwards, only clean fluid particles can remain in contact with the item. Complex apparatuses for immersing the items in the specifically heavy salt solutions or for introducing the item in packages become unnecessary. As regards the cold technique, the method allows a simple and complete regulation of the freezing temperature and thereby the freezing rate.

For foods with particularly sensitive surfaces, which require protection against any penetration of salts, the item is provided before spraying with the cold fluid in a suitable manner with a sweet water ice enamel protective layer, which is also obtained by spraying the item. To this end, as in the aforementioned known methods, the items are taken to a freezing cell with air which is as cold as possible, so that the surface of the item freezes to a very low temperature, for which sweet water is sprayed on its surface to form the ice crust. Immediately after the ice crust forms, the spraying process with the cold fluid is initiated. The freezing cell may be the same as that used for the freezing spray, in which case the cell requires a device for cooling the air.

If a protective enamel layer is desired after the cooling or freezing, a subsequent treatment may be applied by inundation with suitable fluids (such as sweet water).

An appropriate device for executing the method is a shower device disposed above the food and a cooling apparatus placed above, inside or under it, which cools the inundation fluid before the food is inundated.

If the inundation fluid must complete a circuit, filters or similar devices

must be placed in the circuit to eliminate impurities, particularly those impurities that are transferred from the food to the fluid during the inundation.

CLAIMS

1. Spraying method for preserving foods obtained from animals in the freezing process, characterised in that the food freely suspended or stacked
5 is sprayed with a dense shower of a cold fluid, so that the cold fluid that flows first can suddenly freeze the surface of the food, thereby protecting the item against the penetration of the cold fluid, while the fluid that is subsequently sprayed on the item only transfers the cold in order to freeze the item.
- 10 2. Form of execution of the method according to claim 1, characterised in that the item, before spraying with the cold fluid, as in the spraying process, is provided with a protective enamel layer of sweet water ice.